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Efficacy of Ozone gel vs Alvogyl in the Management of Dry Socket

Simerjot Kaur[1] Sweety Jogani[2*] Jaydeepsinh B. Dabhi[3] Priyanshi Kankriya[4] Rohitash Singh[5] Dhaval Abhesinh Charan[6]

[1]BDS, Department of Oral and Maxillofacial Surgery, Luxmi Bai Institute of Dental Sciences and Hospital, Patiala, Dr. Amrik's Dental Implant and Multispeciality Centre, Fatehgarh Sahib, Punjab, India,
[2]MDS, Department of Oral and Maxillofacial Surgery, Luxmi Bai Dental College Patiala, Patiala, Punjab, India,
[3]Senior Lecturer, Department of Conservative Dentistry and Endodontics, Pacific Dental College, Udaipur, Rajasthan, India,
[4]Senior Lecturer, Department of Conservative Dentistry and Endodontics, Pacific Dental College, Udaipur, Rajasthan, India.
[5]Senior Resident, Department of Dentistry, Amaltas Institute of Medical Sciences, Madhya Pradesh, India,
[6]Reader, Department of Oral Medicine and Radiology, Pacific Dental College, Udaipur, Rajasthan, India.

ABSTRACT

Background: Alveolar osteitis is a painful condition that can occur following a tooth extraction. There have been numerous chemical and herbal formulations used to treat this condition, each with varying degrees of success. Our objective was to assess the effectiveness of ozone gel therapy in patients with dry socket through a pilot study.

Material and Methods: A total of 15 patients were selected to receive ozone treatment, while another 15 patients were assigned to the control group and received alvogyl. For the experiment, 1ml syringes were filled with ozone olive oil. The Ozone was applied in a similar manner to alvogyl, involving the placement of alvogyl in the socket after irrigation and debris removal. Following the procedure, the socket was monitored for a period of 2 days and the patient was contacted for a follow-up appointment.

Results: The study included 18 male participants and 12 female participants. Our research revealed significant results regarding pain relief. Over 60 percent of patients who received ozone treatment reported a reduction in pain, while only 20 percent experienced the same relief with alvogyl. When analyzing the effects of ozone, it is evident that the ratio of pain to no pain is 2:3, with the pain being relatively mild.

Conclusion: The ozone group has demonstrated promising healing and postoperative pain results.

Keywords: Alveolar osteitis, Alvogyl, Dry Socket, Ozone Olive Oil.

INTRODUCTION

Alveolar osteitis, also known as dry socket, necrotic socket, or fibrinolytic osteitis, was initially documented by Crawford in 1896.[1] One of the most frequently encountered complications after a tooth extraction is Alveolar osteitis.[2] The condition occurs when the bone around the extraction socket becomes exposed after tooth removal, leaving the socket empty and often filled with food debris. It is commonly referred to as a dry appearance due to the loss of the blood clot.[3] Post-operative pain can occur after a tooth extraction, typically becoming more intense within the first to third day. This pain is often accompanied by a disintegrated blood clot in the socket and may be accompanied by halitosis.

The blood clot that forms after tooth extraction is crucial for the full healing of the underlying tissue. When blood clots are not present, it can hinder the crucial healing process and lead to a condition known as alveolar osteitis. There are various factors

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*Correspondence **Dr. Sweety Jogani.**
Department of Oral and Maxillofacial Surgery, Shree Mahavir General Hospital, Surat, Gujarat, India.
Email: Not Disclosed

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that can contribute to the premature destruction of the initial blood clot. Minimizing risk factors such as local infection, inflammation, trauma, bacteria, and estrogen is crucial as they can trigger the body's response and lead to the destruction of the clot.[4] The occurrence of dry socket is relatively low, ranging from 1% to 3% of all tooth extractions. However, the rate is slightly higher for lower third molars compared to other extractions. In cases where the lower impacted wisdom teeth are involved, it is estimated that approximately 25% to 30% of patients may experience a dry socket. After 2-3 days of extraction, you may experience symptoms of dry socket. These can include mild swelling and redness of the gingiva, bone exposure, halitosis, and severe tenderness upon examination.[5]

Streptococci and staphylococci are anaerobic bacteria that play a crucial role in mixed infections. Treponema Denticola is frequently observed in cases of dry socket. When a culture from dry socket is grown, it reveals a significant presence of Vincent's spirochetes (treponema denticola) and fusiform bacilli.

To prevent the occurrence of Dry socket, it is important to maintain a clean and sterile environment, avoid drinking through a straw, refrain from smoking, minimize mouth rinsing, and prevent any accidental trauma to the mouth.[6] A steroidal anti-inflammatory (NSAID) is typically prescribed to alleviate the discomfort associated with dry socket. It is important to clean the socket before applying a medicated dressing in order to facilitate healing. It is recommended to change the dressing daily, unless there is a noticeable decrease in pain and the socket is showing signs of healing.[7] There are several treatment methods that are commonly recommended for dry socket. The basic approach to managing the socket involves rinsing it with various solutions like chlorhexidine gluconate, saline, dilute hydrogen peroxide, or sodium perborate. After that, the socket is filled with a medicament such as iodoform ribbon gauze, anti-bacterial paste, topical anesthetics, obtundants, zinc oxide and eugenol impregnated cotton pellets, balsam of Peru, alveogyl, Bismuth Iodine Paraffine paste, and metronidazole and lidocaine ointment.[8]

A study was conducted to investigate the effectiveness of photobiomodulation therapy in reducing the occurrence of dry socket and postoperative pain after third molar surgery. It significantly decreased the occurrence of dry socket. Treatment within the first week after extraction may help reduce the risk of developing dry socket, a condition that usually occurs 3-7 days after the procedure.[9] Ozone has been found to have antimicrobial properties. Ozonated water has been found to significantly speed up the healing process of established epithelia within the first two days after surgery, eliminating the need for any additional systemic therapy. The use of ozone has been found to decrease inflammation and pain, while also promoting healing by stimulating the synthesis of certain substances that have anti-inflammatory properties.[10] In addition to reducing inflammation, ozone also promotes the release of nitroglycerin, which helps dilate blood vessels and encourages the growth of new blood vessels in the inflamed tissue. This pilot study aimed to assess the clinical effectiveness of ozone gel therapy in patients with dry socket.

MATERIAL AND METHODS

Regarding the study group the ozone gel was stored in a 1ml disposable syringe and kept in a refrigerated environment. The gel was placed in the extraction socket using a disposable blunt-ended endodontic syringe tip. Alvogyl was used for the control group. Additional materials utilized in this study included saline and sterile gauge.

This study was conducted on a group of 30 patients who sought treatment for dry socket at a Dental Department in a Tertiary Care Teaching Institute in India over the course of one year. A study was conducted to investigate the impact of ozone gel on dry socket. A total of 15 patients were selected for the study group, who received ozone gel, while another 15 patients were chosen as the control group and treated with alvogyl. The experiment involved filling 1 ml syringes with ozone olive oil. The ozone was applied in a similar manner to alvogyl, following irrigation and removal of debris from the socket. Following the procedure, the socket was monitored for a period of 2 days and the patient was contacted for a follow-up appointment. These patients were in good health, between the ages of 15 and 60, and had recently undergone a non-surgical extraction. They were not using painkillers, antibiotics, or oral contraceptives, and were non-smokers. Approach After diagnosing the

patient with dry socket, we obtained written informed consent from the patient to participate in our study. The questionnaire recorded the patient's name, gender, medical history, and type of pain.

Following the removal of debris from the socket and thorough rinsing with saline solution, a gentle application of ozone gel was carefully administered into the dental socket using a sterile disposable syringe and a specialized blunt-ended needle.

The gel was carefully injected into the socket by gently inserting the needle until it reached the base of the socket. The gel was carefully injected and the needle was slowly withdrawn until it reached the gingival level. The socket was covered with sterile gauze and the patient was advised to keep it in place for 10 minutes to ensure the dressing stays intact. The application of the gel was found to be straightforward and user-friendly for the students undergoing the treatment. If patients continue to experience pain or do not notice any reduction in pain, they should contact the student doctor for further guidance. Patients were scheduled for a follow-up procedure after a two-day wait. After the patients declined the consent form for ozone gel placement, Alvogyl was applied following socket debridement and saline irrigation.

During the follow-up appointment, the patient completed a second questionnaire to provide information about their pain and its characteristics. They also discussed the clinical diagnosis of the surrounding tissue and the socket.

Statistical analysis

The data was compiled and entered into a spreadsheet computer program (Microsoft Excel 2019) and then exported to the data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). The quantitative variables were described using either means and standard deviations or median and interquartile range, depending on their distribution. The qualitative variables were displayed as counts and percentages. Confidence level and level of significance were set at 95% and 5% respectively for all tests.

RESULTS

Dry socket was found to be more common among individuals aged 30 to 49. Here is Table 1. Among the 30 patients, 9 individuals refrained from smoking during the healing period. Patients who smoked during the healing period were not included in the study. Of the 30 patients, 15 presented with complaints of halitosis.

The study involved 18 male participants and 12 female participants. These individuals experienced complications related to dry socket. (Refer to Table 2)

Based on the statistical analysis, it appears that there is no significant difference in the healing effect of both treatments on dry socket, as the P value is greater than the alpha level. According to our research, a significant discovery was made regarding the effectiveness of ozone as a pain reliever. It was found that over 60 percent of patients who received ozone treatment experienced pain relief, in contrast to only 20 percent of patients who found relief from alvogyl. (Refer to Table 3) When analyzing the effects of ozone exposure, it is evident that the ratio of pain to no pain is 2:3, with the pain being relatively mild. Based on the data, it appears that the ratio of Alvogyl patients experiencing pain versus those without pain is 4:1, with the pain being of moderate severity. Among the 30 patients, half of them experienced mild pain, while a small portion had severe pain. The remaining patients reported no pain at all.

Table 1: Age wise Distribution in the patients having dry socket

Age (Years)	Number	Percentage (%)
10-19	3	10
20-29	6	20
30-39	9	30
40-49	9	30
50-59	3	10

Table 2: Gender wise Distribution in the patients having dry socket

Gender	Number	Percentage (%)

Male	18	60
Female	12	40
Total	20	100

Table 3: Total number of patients who received either ozone gel or Alvogyl

Medication	Pain	No Pain	Total
Ozone	6	9	15
Alvogyl	12	3	15
Total	18	12	30

DISCUSSION

Patients often experience alveolar osteitis as a common complication following oral surgery, particularly with mandibular third molars. Patients often describe the pain of a dry socket as excruciating, emphasizing the need for timely and proper treatment to alleviate their discomfort.[11] To treat alveolar osteitis, the socket needs to be irrigated to remove any food debris or bacteria. This can be done using various medications, irrigants, and dressings. Numerous chemical and herbal formulations have been tested and proven effective in the past. In recent times, there has been a growing trend towards herbal remedies as people become more aware of the potential side effects associated with chemical preparations.[12] Therefore, this study sought to assess and compare the effectiveness of organic olive oil and Nano-Bio Fusion gel in treating alveolar osteitis. Treatment for dry socket typically involves the use of prescription pain-relieving medication, often in the form of medicated dressings that are applied directly to the affected area. Another option for treatment involves using dressings with zinc oxide eugenol (ZOE) paste. This can provide relief from symptoms when applied to the socket and replaced every 3 days for at least one week. ZOE contains Eugenol, which acts as an analgesic. When Alvogyl paste is used as a dressing, it provides fast pain relief. This product contains three active ingredients that work together to provide multiple benefits. One of these ingredients acts as an anesthetic, another has antimicrobial properties, and the third ingredient offers additional advantages. This new agent, Hemcon Dental Dressing, is a hemostatic agent that also has antimicrobial and wound healing capabilities. It contains an active component that contributes to its effectiveness. Chitosan is a naturally occurring cationic polysaccharide that has the ability to attract negatively charged red blood cells, forming a physical barrier. In a recent study conducted by Kaplan et al., the effects of St. John's wort oil and virgin olive oil were examined in relation to post-operative complications following the extraction of impacted third molars. The study also compared these effects to those of chlorhexidine gluconate plus benzydamine hydrochloride mouthwash. No significant differences were observed among the study groups. Based on the findings, it was determined that essential oils could potentially be beneficial when used alongside mouthwash and other treatments following impacted third molar surgery.[13] In a study conducted by Khan et al., the clinical efficacy of ozone oil gel therapy in dry socket was examined. The results of the study indicated that the ozone oil group demonstrated promising outcomes in terms of healing and postoperative pain relief.[14]In a study conducted by Serrano et al., it was found that NBF gel can effectively reduce post-operative pain. The study focused on the efficacy of a gel containing 2% propolis extract, 0.2% ascorbic acid, and 0.2% tocopherol acetate in preventing surgical complications associated with impacted lower third molar extractions.[15]

The study's findings indicate that there is still uncertainty surrounding the most effective management approach for a dry socket. It is important to note that the available evidence does not provide sufficient support for favoring one treatment method over another. In a study conducted by Guerra et al, the use of ozonated oil was compared in an experimental group with a control group receiving alvogyl and antibiotic therapy. Patients who received ozone treatment experienced faster healing without the need for systemic medication, in contrast to the control group. Based on this discovery, it appears that ozone gel could potentially serve as a viable remedy for alveolitis.[16] A recent study conducted by Filippi has revealed promising results regarding the use of

ozonated water as a cooling and rinsing medium during osteotomy surgery of third molars. The findings suggest that this approach can significantly reduce the occurrence of infection and complications in the post-operative period.[17] In a recent study, Nagayoshi et al explored the potential antimicrobial properties of ozonated water. Their findings suggest that ozonated water could serve as an effective intraoral treatment for various conditions, including chronic periodontitis, aphthae, caries, infection after tooth extractions, chronic wound healing impairments after radiotherapy, mycosis, and root canal disinfection.[18]

All participants in our study did not experience any side effects or adverse effects. Although this study has its merits, such as thorough patient follow-up and diligent pain score monitoring, its limitation lies in the small number of patients included. One drawback to consider is that Ozone water has a relatively short half-life of 10 hours at room temperature, making it impractical for use. Research has shown that aqueous ozone is highly safe and compatible with living organisms, while also being more effective at killing microbes compared to ozone gas and oil-based forms. When certain precautions are taken, the ozonated olive oil can be stored for a significant amount of time.[7,10,11]

CONCLUSION

The ozone group has demonstrated encouraging results in the field of healing and postoperative pain. It is advisable to conduct additional research with a larger sample size in order to determine the statistical significance of the impact of ozonated olive oil on the treatment of alveolar osteitis. After analyzing the findings presented in the paper and reviewing existing research, it is clear that future efforts should prioritize conducting more clinical studies. These studies should aim to establish safe and specific parameters and guidelines for the regular use of ozone in preventing postoperative complications, such as the occurrence of dry sockets.

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